The Structure And Functions Of The Nervous System

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Figure 1. Flowchart of the Nervous System (Interadcom, n.d.)

Task 1

The brain and the endocrine system are responsible for the balance of responses in emergency conditions. For instance, in a stressed condition, the Autonomic nervous system detects the stimuli and sends signals to the endocrine system by sending hormones, and the stress emergency condition copes through blood pressure fluctuation or through pain, injury emotional trauma. The flight or fight response is managed simultaneously through the release of cortisol and corticotrophin hormone by the endocrine system and increased glucose, perspiration, increased heartbeat and glycogenesis. (Britannica, n.d.)

Task 2

The Structure of the Neuron Is composed of the cell body, a Nucleus that lies at the center of the cell body, along with the third part the dendrites that help in the processing of the neurons. It is spine-like in structure, and they are multiple in numbers on a single neuron. The function of dentists is to receive the stimulus or input signals. The fourth part is the axon. It originates from the cell body through a portion called axon hillock and is stalk-like. The function is to pass the nerve impulse. The fifth part is the myelin sheath, which is a protective guard layer present on the neuron surface. The sixth part is the synapse or axon terminal, which is a bulb-like structure used to send signals to the targeted area. The seventh part is Schwann cells, which help to form the cells of the myelin sheath.

Figure 2. Structure of a neuron

Task 3

Figure 3. Structure of Motor Neuron and Sensory Neuron

Similarities and Differences

Differences

The Motor neuron takes the impulse along the nerve path from the CNS to the various parts of the body, such as glands or muscles of the body.	The sensory neuron takes the information from the receptors/ external side of the body and converts it into an electrical impulse.
The motor neurons control all the muscular movement inside the body as they send impulses to smooth, cardiac and skeletal muscles.	The sensory neuron receives the sensory input through all five senses of the body.
The motor neurons are multipolar. They have one axon and many dendrites in structure.	The sensor neurons are pseudo unipolar. They have one axon with two branches of dendrites.

Similarities

The similarity among both neurons is that they help to carry the nerve impulse.

They both transmit the neurotransmitter to other neurons through the synaptic cleft.

They both have structural similarities by having one cell body, cell membranes and axon. (Queensland University, n.d.)

Task 4

The action potential is the movement of nerve impulses along the neuron. It is defined by the myelinated and non-myelinated neurons. The action potential is a sequential process that happens in four steps. The sequence is depolarization, Hyperpolarization and refractory period.

The first step is resting potential, in which the neuron is at the unstimulated stage, and the action potential is -70mv. The next step is threshold potential. It happens when the cell membrane receives the appropriate or maximum potential for the opening of sodium and potassium-gated voltage channels. Depolarization is the next stage in which the Sodium ions enter the cell, and the membrane becomes depolarized it more positive sodium ions. When the sodium and potassium ions distribute across the gradient, the potassium ions start to move out of the cell to maintain the resting

membrane potential.th concentration of K+ Ions increases outside, and the sodium ions close at the stage of Hyperpolarization to maintain the membrane potential of -80mv. There comes a time period called the refractory period, in which the membrane is polarized with the wrong distribution of Na+ and K= ions across the gradient; the neuron in this state will not react to any stimulus and will try to maintain the membrane potential at resting membrane potential to generate another stimulus. (Cliff Notes, n.d.)

With respect to the conduction of nerve impulses in myelinated and no-myelination neurons, the difference is in the speed of the conduction that results from the covering of the axon of the neuron with a myelinated sheath in the case of myelinated neurons. And the absence of it in unmyelinated neurons. The nerve impulses move faster in myelinated as compared to non-myelinated. The myelinated sheath triggers the conduction. (Antranik, n.d.)

b. the rate of oxygen consumption increases when the nerve impulse conducts a high-frequency nerve impulse because it helps in more ion movement into the cell and potassium out of the cell. The active firing of neurons stimulates the infusion of neuron area with a rich oxygen supply. The oxygenation of the hemoglobin in the brain helps in the efficiency of nerve impulses. [3] that is why it consumes much more. (Amit Kulshreshtha, 2011)

Task 5

Events of Acetylcholinesterase release at the neuromuscular junction

The motor neuron receives a nerve impulse at the end.

The opening of calcium-gated channels occurs, and there is a sudden rush of calcium at the end of the nerve ending.

The neurotransmitter acetylcholine interacts with the motor plate at the fold of the junction to cause diffusion of nicotinic cholinergic receptors.

The depolarization of the membrane happens due to the influx of Na+ and K+ electrical conductance at the motor ending plate.

The action potential is generated as a result of the influx, and both sides of the muscle fiber receive the action potential.

The muscular contraction happens, and acetylcholine is removed from the postsynaptic cleft by the acetylcholinesterase. (Medu hub, n.d.)

Figure 4. Sequence of the acetylcholine transmission (Medu hub, n.d.)

B. the neurotransmitter GABA causes the influx of negative chloride ions inside the past synaptic membrane, and it will lead to membrane hyperpolarization. There would not be enough threshold for the action potential, and sodium influx would not happen. It will then inhibit the production of nerve impulses. (Charlie Cooper, n.d.)

Task 6

A: Frontal portion

B: Infundibulum

C: Medulla/Brainstem

D: Cerebellum.

The function of structure D is the regulation of the sleep cycle, heartbeat, breathing and eating activity. It deals wth the basic functions related to autonomic nervous system of the brain. (Lumen, n.d.)

B. The anterior lobe of the hypothalamus regulates the concentration of 8 hormones released by the gland through localized regulation. The changing concentration of the hormones in the blood triggers the hypothalamic nuclei inside the hypothalamus to release peptides in the blood vessels. These released peptides order the pituitary gland to increase or decrease the concentration and maintain it to normal. It is the basic regulating mechanism of hypothalamus nuclei cells. (Biology Reference, n.d.)

Task 7

The left side of the brain is concerned with language formation and word interpretation in the human brain. The brain detects the word, and an image forms on the retina of an eye. The image is decoded through optic nerve impulses and other bundles that send signals to the visual cortex of the brain present at the posterior side of the brain.

The sensory cortex will detect the signal, and the brain will help in understanding the context of the words through the cerebellum. This is the process of image formation till recognition of that word inside the brain. (David Abbot, 2016)

References

Amit Kulshreshtha, 2011. *Role of Oxygen in nerve impulse.* [Online]
Available at: http://blog.goalfinder.com/blog/template_permalink.asp?id=100
[Accessed 9th April 2011].

Antranik, n.d. *Conduction of the Action Potential along the Nerve Fiber.* [Online]
Available at: http://antranik.org/conduction-of-the-action-potential-along-the-nerve-fiber/

Biology Reference, n.d. *hypothalamus.* [Online]
Available at: http://www.biologyreference.com/Ho-La/Hypothalamus.html

Britannica, n.d. *Flight-or-fight-response.* [Online]
Available at: https://www.britannica.com/science/fight-or-flight-response

Charlie Cooper, n.d. *Coordination.* [Online]
Available at: https://studywise.co.uk/wp-content/uploads/1.2_coordination_qus.pdf

Cliff Notes, n.d. *Transmission of Nerve Impulses.* [Online]
Available at:
https://www.cliffsnotes.com/study-guides/anatomy-and-physiology/nervous-tissue/transmission-of-nerve-impulses

David Abbot, 2016. *What brain regions control our language? And how do we know this?.* [Online]
Available at:
https://theconversation.com/what-brain-regions-control-our-language-and-how-do-we-know-this-63318
[Accessed 26 September 2016].

Interadcom, n.d. *flowchart of central nervous system.* [Online]
Available at: http://www.interadcom.com/asa/chapters/ns_flow_chart.pdf

Lumen, n.d. *The brain stem.* [Online]
Available at: https://courses.lumenlearning.com/boundless-ap/chapter/the-brain-stem/

Medu hub, n.d. *Neuromuscular junction.* [Online]
Available at: http://www.meduhub.com/mod/view.php?id=105&type=15

Queensland University, n.d. *Nuerons types.* [Online]
Available at: https://qbi.uq.edu.au/brain/brain-anatomy/types-neurons